

Review of Criteria Used to Measure Library Effectiveness*

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ABSTRACT

This article reports the results of a survey of literature on measures of library effectiveness. This survey led to the formulation of six criterion concepts (accessibility, cost, user satisfaction, response time, cost/benefit ratio, and use). The advantages and disadvantages of each method of measurement are discussed. Several points which became clear during the analysis are discussed. First, there is a relative lack of concern with the rationale behind the evaluation process, although the results invariably lead to a confused interpretation when there is no clear understanding of the purpose of an evaluation. Second, the total library system is rarely considered; instead, each evaluation criterion is taken in isolation rather than as part of the whole. Third, the library's preservation function has not been considered at all.

LIBRARIES are always seeking better ways to evaluate performance and always running into difficulties. Some of these difficulties arise from the lack of available techniques for measuring and evaluating the quality of a service or function. One fundamental problem is that none of the current evaluation methods seems to consider total library performance as critical to making a valid evaluation. Also, most of the present evaluation techniques do not seem to be sufficiently sensitive to both quantitative and qualitative factors of library service and are therefore not completely acceptable to either librarians or nonlibrarians.

This is a report on a literature survey which

was part of a study undertaken for the National Library of Medicine*. The study objectives were to develop a list of issues and criteria relating to the measurement of medical library effectiveness. When appropriate, other types of libraries were considered, since there exists a rather broad common bond between all libraries. The procedure employed was to review the literature on the subject of library evaluation. Each criterion encountered was listed and examined in terms of its potential significance and validity for measuring library performance.

Many measures have been employed in attempts to evaluate library performance, as we discovered in our review of over five hundred articles, books, and abstracts. Obviously, not all of these measures were unique; they were in fact slight modifications of one another. In order to make sense of the extensive list which we had accumulated, we grouped them in accordance with the aspect of the system that was being evaluated. These we called "criterion concepts"—for an example, accessibility of materials, cost, and user satisfaction are some of the important concepts in evaluating library effectiveness. The specific techniques or data used to measure these concepts we called "criterion measures." In the list below, the six criterion concepts are labelled with Roman numerals, while the specific criterion measures are ordered by Arabic numerals. We believe that this distinction between concepts and measures is meaningful and that it eliminates a good deal of confusion in the literature on library evaluation. In addition, the list enabled us to organize and classify the various evaluation procedures we came across in our review of the literature, for most of the reported measures turned out to

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be slight modifications of one of six basic criteria. The complete list that follows indicates the criterion concepts (Roman numerals) and the various specific criterion measures (Arabic numerals) that fall into the basic categories.

- I. Accessibility
 1. Number of services and degree of services provided various classes of users.
 2. Ratio of services requested to services available.
 3. Ratio of holdings to total user population (actual and potential).
- II. Cost
 1. Staff size.
 2. Staff skill and characteristics.
 3. Unit cost.
 4. Ratio of book budget to users.
- III. User Satisfaction
 1. User satisfaction with services rendered.
 2. Number of user activities in library.
 3. Percentage of items in collection as listed in some checklist.
 4. Percentage of items in collection by type of materials (books, serials, reports, etc.).
 5. Percentage of items in collection by type of material compared to various classes of users.
 6. Quality-value of items in collection based on expert opinion.
 7. Ratio of documents used to materials requested.
- IV. Response Time
 1. Speed of services.
 2. Ratio of number of services offered to average response time for all services.
 3. Ratio of response time (to secure document) to total time document is of value.
 4. Ratio of holdings to response time.
- V. Cost/Benefit Ratio
 1. Ratio of services provided to total cost.
 2. Ratio of total service expenditures to users (actual and/or potential).
 3. Ratio of item cost to item value or utility.
 4. Ratio of a given service (including overhead cost) to response time cost.
- VI. Use
 1. Gross use of services (reference questions answered, bibliographies completed, etc.).
 2. Ratio of actual users to potential users.
 3. Total library use (attendance figures, circulation, etc.).
 4. Ratio of a given service to total number of users.
 5. Ratio of total use for all services to total number of services provided.
 6. Percentage of materials used by type and by class of users (student, teacher, researcher, etc.).
 7. Ratio of documents circulated to various classes of users.
 8. Ratio of documents circulated to number of users.
 9. Ratio of total use to total holdings.
 10. Item-use-day (a measure based on the number of items used in a twenty-four hour period).

BACKGROUND COMMENTS

Perhaps the most surprising aspect of the literature review was the lack of concern with the how and why of the evaluation process. It would seem to be self-evident that any evaluation of library performance should include a discussion of the purpose, the method of evaluation, and the reasons for evaluation. There are a surprising number of reports and studies on the subject of evaluation that fail to make it clear just what the purpose is. Consequently, confusion arises over the interpretation of the results. Of the studies surveyed very few identified the goals or the importance of a given service to the achievement of those goals.

Even more disturbing was a general lack of consideration for the total service program of a library. Most of the studies, for presumably sound reasons (although seldom spelled out), confined themselves to one or two evaluative measures applied to one or two service functions. While no single study can cover all services, some attention should be given to the way in which the functions studied or evaluated relate to the total program of the library. In general this total service concept was lacking, and since the study goals were not stated, it was difficult to determine whether the various criteria were appropriately selected and employed.

Even those few studies dealing with the full range of services failed to consider one of the most basic of all library functions, conservation. Dissemination, the library's best-known func-

tion, has been carefully considered; however, conservation for later dissemination has been consistently ignored. None of the studies examined concerned itself with the question of conservation. While it may be true that only the large teaching-research-regional medical library must be greatly concerned with conservation, all libraries need to consider the question to some extent. Many methods of evaluation place a high premium on the performance of a service (circulation) that is or may be detrimental to the conservation of materials—an equally important library function. When evaluating library effectiveness, the total program of library services and functions must be taken into account.

In the discussion that follows, we will analyze the literature on library evaluation in terms of the six criterion concepts we have delineated and will summarize the problems and ways of dealing with them. Although citations to individual studies are not included in the text, those studies we consider to be particularly significant are listed in the bibliography.

EVALUATION CRITERIA

I. *Accessibility*

Accessibility to the library and its contents is without a doubt one of the most difficult criterion concepts to measure. Of the studies discussed, accessibility factors are seldom considered. There are at least two aspects to the question of access: (a) physical access to the library and its materials, that is, the ease with which one may determine if a particular document is in a collection and where it is located, and (b) user access, that is, to what class of user a given service is available. In order to measure physical accessibility in a quantitative manner, it becomes necessary to consider one of the other evaluation criterion concepts, response time, but many studies fail to take both aspects into account. Even in this circumscribed area of library performance evaluation there seems to be a failure to consider all aspects of the service function.

There is no question about the need to consider accessibility in evaluating any library performance. Rapid response time, low cost, may *not* be a reflection of ideal library performance. Ninety-nine percent of existing libraries could probably achieve the above performance goal,

without a budget increase, if they were to concentrate only on known user needs. Libraries could achieve rapid response time, for example, at the expense of cutting back on services to "marginal" users and on "marginal" materials. Any system of performance evaluation that ignores the question of accessibility, or at least availability, of a range of materials to a multiplicity of users, will only compound the library's problem by encouraging a concentration on improved performance for the known factors, and thus in fact hamper the total system performance.

For example, several studies have shown that a few active users account for most of the total use of a library, while most patrons are infrequent users who make few demands for service. If the library focuses on the heavy users and their known demands and needs, it can achieve an outstanding performance record in terms of almost everything except accessibility of materials and services to the larger user population. Accessibility measures are essentially ratios of services to users. The rating can be improved by increasing services or by decreasing the number of users. The first alternative is, of course, the necessary one.

II. *Costs*

There has always been a concern with cost control in libraries. Yet throughout most of the history of library development, libraries have approached the problem of cost analysis in a most elementary and timid manner. The reluctance to analyze costs can in part be attributed to lack of training. Also, library trustees and the general public have not been cost conscious due to the low level of library expenditures. Not until recently, when the level of expenditure rose sharply, did anyone demonstrate real concern about unit costs and cost control. While cost figures alone should not be used to evaluate a library, they are useful in determining the efficiency of some operations, and, when used in combination with other criteria, cost figures can begin to provide insights into library performance.

Although material processing costs have been studied, there seems to be a great reluctance to put a "price tag" or unit cost figure on public service activities. Admittedly the "value" of a service is difficult to measure, and a high unit cost figure may create problems in demonstrat-

ing the desirability of such services. Nevertheless, efforts to assess the costs of public service activities must be continued in order to develop a complete picture of library performance.

As an example of the problem, most reference departments keep some "statistics" on the number of reference questions asked. Dividing the total number of questions asked by the total cost of maintaining the reference department, including overhead, one can compute a unit cost figure. But what does this tell us about performance? A high or low figure may or may not reflect a "good" performance. A large number of simple questions being answered by staff members from sources the users could consult without assistance would produce a low unit cost but would not necessarily mean a good total library performance. Everyone can think of several other examples. The point here is simply to note that while cost is an important criterion in evaluation, it must be considered in conjunction with other factors.

Personnel costs are also often oversimplified. Many articles have been published on the number of staff required and the qualifications, special training, or skills needed to perform certain services adequately. It is generally recognized that an arbitrary number of staff members cannot be set but must depend on the kind and scope of service provided, the content of the collection, and the size of the organization served. The ALA College Library Standards prescribe a minimum number of professional librarians with additional hiring determined by size of population served, type of library organization, size and character of the collection, prevailing community interests, number of hours the library is open, and the physical layout of the building. In 1964 the Special Libraries Association suggested a ratio of 2-3 nonprofessionals to every professional library staff member. However, very little thorough research has been conducted on the number and kind of personnel needed to perform a particular library service, nor on the type of skills and knowledge that lead to better performance. Decisions are still being based on educated guesses and not on empirical studies.

One must simultaneously consider both the personnel requirements and the costs of performing various services when evaluating performance. These are interactive! One should have some method of evaluating performance

to determine what the personnel requirements ought to be, and one should know what abilities are represented in the personnel performing the work being evaluated. That is, if one wishes to justify a new position or service to be performed by a certain category of personnel, one should have some method of analyzing the task and relating the performance measures to the personnel skills required for its successful accomplishment.

To expect clerical personnel to perform at a professional level is unrealistic. Yet in many instances of gathering cost figures, no record has been made of who performed the task involved. If one calculates costs without considering efficiency of the operation or the personnel skills required, the cost figures could be meaningless or even misleading. The important factor is to be sure the costs are included and that they are valid or at least clearly defined costs in terms of the service being evaluated. The measures we have listed under II. *Costs* are representative of the techniques that have been used in evaluating the costs of library services.

III. *User Satisfaction*

Within the broad heading of user satisfaction, there are two distinct subgroups to be considered: (1) user satisfaction with existing services and materials, and (2) user needs for services and materials not presently available.

Determining user requirements is most important as an aid to the evaluation, selection, and weeding of materials. One common technique utilizes an examination of user attitudes and methods of gathering information. Another technique surveys patrons' use of the library. Such studies are oriented towards basing a collection on demonstrated user needs. An equally valid procedure is to concentrate on the needs which are not being met.

User satisfaction and goal achievement are measures of the effectiveness of the service performed. The degree of services provided by the library and the extent of these services should be selected because they effectively achieve a given goal or level of user satisfaction. The users of special libraries will need more bibliographic services (such as literature searches, preparation of abstracts, bibliographies, and translations) than will the much larger and more general clientele of a public or college library.

Employment of the user satisfaction criterion to measure library performance creates certain fundamental problems that need to be recognized:

- (a) A strong subjective element is always present. Each person has his own expectations with regard to a service. The ideas of various users are similar, but they vary in detail. This variation can and does cause differences in the users' sense of satisfaction. In addition there are degrees of satisfaction, and these are extremely difficult, if not impossible, to differentiate and quantify.
- (b) Comparative studies of user satisfaction criteria must be preceded by expensive testing of the measuring instrument and training of subjects to insure that different individuals interpret the questions in the same manner. The development and extensive validation testing of a measuring instrument which could be widely used for determining use attitudes would begin to solve part of this problem.
- (c) Providing a universally accepted definition of the term "relevant" is very difficult. This is an important problem, because in order to determine user satisfaction with documents received, or with services rendered, one cannot avoid the question of relevancy. When users judge relevance by different standards, interpretation of results becomes complicated.
- (d) A generally low response rate to survey questionnaires precludes obtaining a representative sample of actual and potential users without a great deal of expensive preparation and effort. Even if the other problems are overcome, survey results will still not be useful unless the sample is shown to be representative of actual and potential users.

Nevertheless, user satisfaction must be considered one of the primary measures of library effectiveness. It is, however, an adequate criterion of effectiveness only when employed with a full understanding of its limitations and in conjunction with other criteria.

IV. Response Time

The use of response time as a measure of library performance is a relatively recent development. Its use is increasing, since many in-

vestigators view this as one of the more objective measures, subject to easy quantification. It is possible to measure response time in a number of ways by varying the stopping and starting points and employing either real, elapsed, or some "average" time for different situations. As with the other criteria it is also possible to use this measure for different purposes, e.g.,

- (a) To measure the time required to secure a copy of a specific document.
- (b) To measure the time required to secure a specific piece of information or have a given service performed.

While response time is a quantitative criterion of library performance and has a high degree of objectivity when certain parameters are agreed upon, it tends to be used too often as the sole measure of performance. It may take longer to retrieve a document from a large library collection than from a small one, but no librarian would want to limit his collection for the sole purpose of making books easier to locate in the stacks.

There are other factors that must be considered. User satisfaction may fall off even if response time is improved should too many errors result and should costs increase.

Is a system which is excellent with regard to response time necessarily satisfying to all users for all needs? It seems unlikely because of the cost and the overloading that would occur due to high demand. As with the other criteria, response time is best considered as part of the total system of evaluation, with a weight assigned to the time factor commensurate with its value in achieving a specific goal or service objective. Such a test is difficult to develop, and so other factors are frequently omitted while response time alone is measured.

The following is an example of the problems involved in using response time as the measure of performance in the evaluation of medical libraries. All medical libraries, in theory at least, have access to national medical resources; however, *not all* medical library users have an opportunity to make use of such facilities. Medical students and others are sometimes not allowed to request interlibrary loan materials, and this limits the accessibility of library materials to them. Nevertheless, one study included interlibrary loan time as one factor in the response time and ranked performance on this basis. It seems questionable whether anything more than

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response time for a certain class of materials and for a limited number of users was in fact measured. The total library function and services to all classes of users were not adequately considered.

V. *Cost/Benefit Ratio*

Only a very few studies have been completed which apply cost/benefit analysis and use the methods developed by business and government for measuring cost/benefit in a total system. There have, however, been a number of library studies that measure cost/benefit analysis primarily in terms of services provided.

Generally, a library cost/benefit analysis uses a ratio of total expenditures to users and services in order to determine cost effectiveness. Another method of analysis is to divide the calculated costs of all services into fixed and variable groups. Performance budgeting concentrates on the character of the work performed by each unit and may have more merit than simply listing costs under categories of services and materials purchased. This method of budgeting requires a thorough knowledge of the services to be performed and the amount of use each service receives as well as accurate cost figures.

One significant feature of performance budgeting is the burden it places on the administrator to justify, on the basis of performance, budget requests for additional funds. This is extremely difficult; however, if this method of budgeting is increasingly applied to educational institutions, including libraries, perhaps significant progress in evaluating performance of all service oriented nonprofit organizations will be forthcoming. Reliable methods of evaluation are not yet available.

Cost/benefit analysis could be considered, at least in theory, as the sole criterion of library performance. In practice, this would be possible only if a large number of different benefits were considered (for example, cost/accessibility, cost/use, cost/user satisfaction, cost/response time). In order to evaluate total library performance each broad division would have to be subdivided for analysis (for example, cost/medical student/accessibility, cost/house staff/accessibility, etc.). While cost/benefit seems to have a great deal of promise, it is at present subjective, imprecise, and inconsistent, and thus involves more measurement problems than most of the other criteria that have been discussed. A

"benefit" can be almost anything, and "costs" can be computed in many ways. As a result there are many variations and slight modifications which make comparisons difficult if not impossible. Terms and procedures need to be operationally defined. In spite of the difficulties, cost/benefit seems to be a very important potential criterion for measuring library performance.

VI. *Use*

Although library use has been employed as a measure of performance for some time, the units measured have not been very precise or meaningful. Normally the unit employed is the number of documents circulated. Occasionally the number of registered borrowers has been used as a measure of library use. As the number of items circulated or the number of borrowers increased, the level of performance was assumed to rise. Recently, attempts have been made to predict through circulation figures the amount of use a library will receive. These newer approaches represent an improvement in measurement techniques and should provide a better basis for evaluating and improving library services.

Some of the newer techniques have been designed to improve the utility of the library collection. Studies of this type may lead in some cases to reduction in size of collection to make it easier to find materials and, therefore, to reduce the response time, thus generating greater user satisfaction. It is conceivable that use studies, employing probability statistics and involving the characteristics of used and unused materials could isolate some basic factors that could be employed to improve the selection of material. If that were to happen, a more efficient expenditure of funds could result.

Some attempts have been made to determine the relevance of the collection to user needs by gathering data on the actual use of the collection. This in turn is considered a measure of the library's performance capability. Another approach to partially evaluating the collection and the library on the basis of use is to analyze reference questions asked, whether answered or unanswered. Such an approach will clearly define the active user's needs and can be a partial guide for collection development. However, one would need to be extremely cautious about applying these data for evaluating the library's

total performance since only the needs of active users would be apparent, and even such users do not ask all of their questions at the library.

There are a number of problems that arise when the use criterion is employed to measure library performance:

- (a) It fails to differentiate between types of use (significant and insignificant).
- (b) It seldom includes "in house" use. (Such data can only be gathered with expensive data collection methods.)
- (c) It is susceptible to radical variations if the very active users (a small percentage of the total user population) change their use patterns.
- (d) It fails to reflect the needs of those potential users who have either not attempted to use the library or have given up as a result of repeated failure.

Evaluating performance on the basis of use is difficult; however, this is a necessary criterion which, if carefully employed, would begin to provide an objective measure of the total library effectiveness. Measures of use are basic; they encompass all library functions, and they are not subject to misinterpretation. Costs are also objective, but performance cost figures often do not relate to user satisfaction. Cost/benefit analysis appears to be reasonable, but actually subjective definitions of benefit are often involved. Response time is also an objective measure, but it does not measure the relevance of the information provided. Thus use, while not completely satisfactory, can be considered a partial index of relevance and of a library's ability to provide needed services to some portion of the total potential user population. Use as a criterion concept is basic to all performance evaluations, but the techniques employed to measure use must be made more reliable and meaningful.

SUMMARY

Our literature search indicates that in measuring library performance a great many variations of a few basic approaches have been tried. Most of the studies concentrate on one or two services. The literature in general reflects the lack of consideration of (a) the total service program, and (b) the importance of using multiple criteria for evaluating service functions. Without such consideration it seems to be impossible

to arrive at valid measures of library performance.

As a further complication, one must consider whether all the measures, even the six "basic" criterion concepts, are equally important for measuring all services. If not, these should be weighted to reflect their relative importance both for the evaluation of a specific service and for the total library program. Research that would provide an empirical basis for deciding these issues would seem to be of primary importance. Libraries perform multiple services, and therefore it seems unlikely that any single criterion can be considered as the sole valid measure of library performance. When it is possible to apply several different criteria, the question of weighting each one becomes critical. In order to determine what the weighting factor should be, one needs to know the relative importance of each element in achieving a specific library function.

In light of these considerations, it is suggested that research should be directed to the development of a technique to aid in establishing for each individual library a list of its services, ascribing to each service its relative importance to the total library program. A second phase of this problem would be to determine which criteria were appropriate to measure the performance of these services and the weight that should be assigned to each. For example, does it seem valid to give the same weight to response time for two such different services as translation and information-reference? While response time would be a valid criterion in both cases it seems likely that most people would rather see a slower response time (less weight) and more accessibility (more weight) when evaluating a translation service. However, these differentiations have not yet been made.

Considering total library performance, conservation is another area that needs to be investigated. No studies were encountered in the literature search that even discussed conservation as an aspect of library performance. A library may incur conservation losses when user services are increased, and some techniques should be developed for counterbalancing these functions. From an overall point of view, it would seem that less effort should be devoted to developing modifications of existing measures of performance evaluation and more effort

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should be directed toward developing precise operational procedures for—

- (a) defining the variables involved in the measurement of each criterion concept;
- (b) specifying the statistical data and formulas needed to calculate the criterion measures;
- (c) suggesting a procedure that will enable one to combine these individual criterion measures so as to evaluate total library performance;
- (d) developing a procedure to weight the individual criterion measures in accordance with each library's estimation of the importance of services being provided; and
- (e) eventually arriving at a procedure whereby meaningful comparisons can be made of libraries.

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